# Consultation and Survey Report

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***NOTE: The findings from the meetings and response guides presented in this report were used to clarify directions and make improvements to the Senior High Science programs.***

**4, 1990**

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## PREAMBLE

On January 26, 1990, the Minister of Education announced a new structure and direction for the senior high science programs. Input was sought from a number of interest groups and stakeholders. A response guide was developed encompassing a wide range of concepts and skills, and comments were solicited. Meetings were held across the province to outline the entire developmental process, encourage considered opinion and to foster cooperation and confidence in the programs.

### Groups Consulted

- senior high science teachers
- post-secondary institutions
- scientists and post-secondary science instructors
- professional groups
- government departments, crown corporations and the private sector
- private citizens
- Northwest Territories Education

## RESPONSE GUIDES

About 1500 response guides were mailed to a variety of groups including teachers. Responses were received from 375 teachers and 29 groups, representing all the groups consulted.

The major findings were:

- all concepts and skills catalogued were viewed as being important or essential; few deletions were proposed despite obvious time constraints

- knowledge items were rated essential more often than were application items and items that show how scientific knowledge developed over time

- teachers favoured keeping the current content and sequence while members of other groups indicated that change would be desirable

- some respondents indicated that there should be greater continuity and linkages among courses and programs.

## MEETINGS

Alberta Education held some 20 meetings across the province with teachers, public and private corporations and professional groups. About 70% of the science teachers in the province were involved in the meetings. These meetings played an important part in clarifying directions for the science programs and making improvements.

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## SUMMARY OF COMMENTS FROM RESPONSE GUIDES AND MEETINGS

### Science 10

- accept Science 10 as a prerequisite to all 20-level science courses
- support for the integration of the sciences by a significant number of teachers
- reduce the knowledge component and increase the development of skills

  (at the same time, numerous concept and skill additions were suggested)
- specify and integrate science, technology and society (STS) connections
- give appropriate attention to students' intellectual development and abilities

  (e.g., the mathematical treatment of concepts)
- prepare teachers to deliver an integrated program.

### Science 20/30

- seek post-secondary acceptance of the program
- promote acceptance of the program by students, schools, parents and other Albertans
- support an integrated program for students requiring a broad science background.

### Biology 20/30

Among teachers, there was general agreement to maintain the status quo; however, numerous other respondents favoured change. In regard to topic sequencing, the following comments were made:

- retain current sequence (strongest support in teacher group)
- reverse sequence between 20 and 30 levels (strongest support from other respondents)
- combine science knowledge for spiral curriculum in Science 10, Biology 20 and Biology 30
- integrate science knowledge in Biology 20 and 30 with suggested examples.

### Chemistry 20/30

- support by many teachers for the topics and their arrangement in the current chemistry program
- support by a number of respondents for a spiral approach with some improvements in the program (e.g., more emphasis on laboratory and project work, communication and higher-order thinking skills, estimating skills, safety and awareness of WHMIS).

- support by a few for major changes in content and approach to chemistry
- support by a few for a more advanced program, which would include topics currently taught in post-secondary courses
- support by several groups for more in-depth treatment of fewer topics
- keep the focus on science concepts and principles, while integrating STS connections

### Physics 20/30

- support by many for more laboratory experiences to foster students' understanding of concepts
- support by many for integrating mathematical skills into the physics program

Other comments indicated a diversity of opinion:

- retain current content with some additions
- retain and increase emphasis on the historical perspective
- stress the development of skills and include STS content
- emphasize classical mechanics, electrostatics and simple DC circuits with rigorous mathematical treatment.

## GENERAL COMMENTS

The following are some of the general comments raised in response guides and meetings:

### Skills

- help students to learn the mathematics and processes of science
- stress communication skills, especially writing
- place greater emphasis on measuring laboratory skills in the final evaluation of students
- develop skills without overburdening the student with a large number of concepts
- provide continuity with junior high science and senior high mathematics programs.

### Teacher Inservice

Develop inservices to help teachers:

- offer an integrated science program
- make students active learners
- gain a better understanding of technological applications and the connections among science, technology and society.

## Distance Education

- review alternate delivery systems that will help small schools offer the new science programs.

## Workplace Hazardous Materials Information System (WHMIS)

- increase awareness of the guidelines that have been developed for the classroom management of chemicals and hazardous wastes
- give consideration to the legal problems that may arise from WHMIS
- help teachers to provide laboratory activities without placing the students at risk
- include WHMIS guidelines in both the programs and the texts.

## Laboratory Facilities and Equipment

- consider the need for laboratory facilities and equipment as programs are developed.

# VISION

# Senior High Science Programs

*NOTE: The VISION provides the framework to be used in developing the Senior High Science programs. It includes the curriculum components that will be addressed in each program.*

# Vision Senior High Science Programs

The Senior High Science Programs will help all students attain the scientific awareness needed to function as effective members of society. Students will be able to pursue further studies and careers in science, and come to better understand themselves and the world around them. To achieve this, appropriate curriculum components are identified, and approached from a common philosophical position in each science course. These components include expected student knowledge, skills and attitudes.

The Senior High Science Programs focus on students learning the big interconnecting ideas and principles. These ideas, or major principles, originate from science knowledge that transcends and unifies the natural science disciplines. These major ideas include change, diversity, energy, equilibrium, matter and systems; the process by which scientific knowledge is developed including the role of experimental evidence; and the connections among science, technology and society. The ideas will also form a framework for the curriculum, provide continuity with the junior high program and build on students' previous learning.

The Senior High Science Programs place an increased emphasis on developing methods of inquiry that characterize the study of science. For example, students will further their ability to ask questions, investigate and experiment; gather, analyze and assess scientific information; and test scientific principles and their applications. They will develop their problem-solving ability and use technology appropriately. By providing students with opportunities to develop and apply these skills, they will better understand the knowledge they have acquired.

Students will be expected to show an appreciation for the roles of science and technology in understanding nature and maintain a life long interest in science. They will possess positive attitudes toward and an enthusiasm for science.

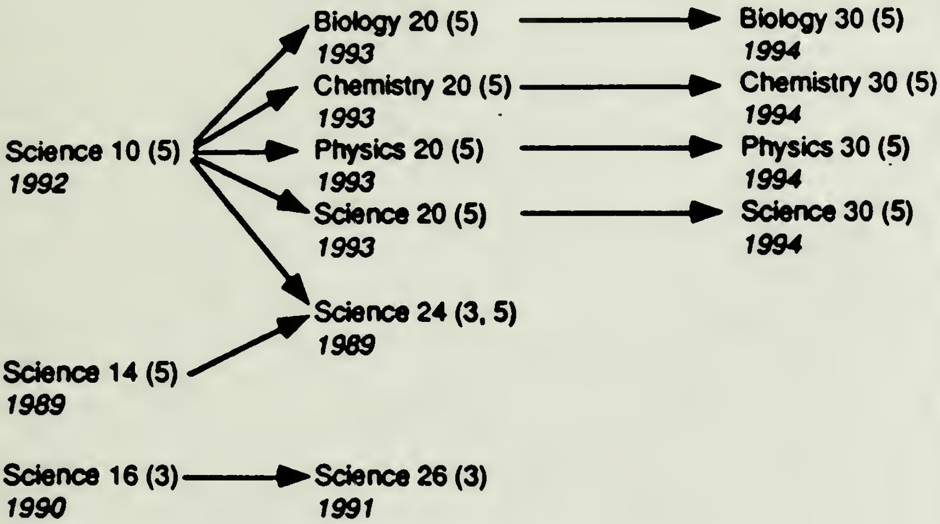
The learning context is an integral part of the Senior High Science Programs. The context is intended to foster the expected attitudes in students, further the development of students' skills, and increase students' understanding of science knowledge, science process, and the connections among science, technology and society. The context for learning will be relevant to students' personal life so they will experience science as interesting and dynamic. Learning opportunities will be made meaningful by providing concrete experiences which students can relate to their world.

The Senior High Science Programs places students at the centre. Students are active learners and will assume increased responsibility for their learning.

This provides the framework for the development of programs including Science 10-20-30, Biology 20-30, Chemistry 20-30, Physics 20-30, Science 14-24 and Science 16-26. The programs will have a common rationale and philosophy, goals and general learner expectations. As well, each program will have specific learner expectations and standards of achievement.

The Senior High Science Programs including respective courses, with credit designations and implementation timelines, are outlined on the following page.

# Vision Senior High Science Programs



Numbers in parentheses indcate to credits per course.

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